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EXAMINER

RICHARD, CHARLES R

ART UNIT	PAPER NUMBER
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1712

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/611,766

Applicant(s)

XIAO ET AL.

Examiner

C. R. Richard

Art Unit

1712

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5 and 7-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5 and 7-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-2, 5 and 7-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, the limitation added to claim 1 (and the others by dependency) by Applicant's amendment, "a density higher than 1.35 g/cm³" is not given explicitly in the specification or the claims as originally filed, nor is it given implicitly in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant's amendment gave no indication of where support for this limitation was present, nor could the Examiner find it. A disclosure of "higher than 1.2 g/cm³" was the closest that the Examiner could locate, but is deemed insufficient to support the very specific "higher than 1.35 g/cm³".

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-2 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over disclosures in WO98/56497. This reference teaches fracturing fluids and methods of fracturing a subterranean formation therewith (see page 3, lines 5-9).

One method involves pumping a fracturing fluid disclosed through a wellbore and into a formation at sufficient pressure to fracture the formation (see page 3, lines 5-9). The fracturing fluid may comprise an aqueous medium, a zwitterionic surfactant and inorganic salts (see page 2, lines 7-17), and it may also contain a gas such as air, nitrogen or carbon dioxide to provide an energized fluid or foam (see page 6, lines 5-8). The zwitterionic surfactant may be a betaine containing an alkylamidopropyl group

where alkyl may be erucyl or oleyl (see page 6, lines 21 to page 7, line 23 and formula V on page 8).

Exemplary salts include water-soluble potassium and sodium salts [potassium bromide, potassium carbonate and sodium bromide would qualify], calcium chloride, calcium bromide and zinc halides. The CRC Handbook gives the density of aqueous 30 weight percent calcium chloride solution at 20 deg C as 1.28g/cm³, that of KBr as 1.26g/cm³, that of NaBr as 1.28 g/cm³ and that of 50 weight percent K₂CO₃ as 1.54 g/cm³. Perry's Handbook gives the density of aqueous 30 weight percent zinc chloride as 1.29 g/cm³ at 20 deg C, 50 weight percent as 1.57 g/cm³, 30 weight percent zinc bromide as 1.32 g/cm³, 40 weight percent as 1.46 g/cm³ and 50 weight percent as 1.64 g/cm³.

The reference teaches all of the limitations of the rejected claims, except for the specific foam quality and the specific density limitation. One of ordinary skill in the art upon deciding to use an energized fluid according to the reference would have had to select a foam quality to operate from, and it would have been obvious to perform the routine experimentation needed to optimize this parameter. In the course of this work, such an artisan would have come up with qualities within the scope of the rejected claims, especially considering that the foam quality recited is not very specific (at least 25%).

As to the density, the reference teaches that the inorganic salts will typically be present in only a "minor" amount and gives an example at that point of less than about 20% by weight (see page 11, lines 23-25). In the context of the reference, minor means

Art Unit: 1712

"less than major" or "less than half" as opposed to "very small"; this is confirmed by the disclosure of up to 30 weight percent inorganic salt being typical (see page 12, lines 31-35). The point here is if something is present typically in a minor amount and typically at up to 30 weight percent, then minor doesn't mean very small but something less than half.

In any case, interpolating between the data points given above for zinc bromide, a zinc bromide solution of just a little over 32 weight percent would have a density of just over 1.35 g/cm³; a little over 32 percent solution would have been at least obvious to one of ordinary skill in the art over a teaching of typically up to 30 weight percent (and also at least obvious over a teaching of less than half). Of course, use of a fluid with this amount of salt and accompanying high density would allow for fracturing at comparatively reduced surface pressure. The claims are thus rendered obvious.

Note that there is a US equivalent to the cited WO document, US Patent 6,258,859 to Dahayanake et al., which issued/published about 2 and a half years after the WO document cited here.

5. Claims 1-2 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fu et al. in US Patent Application Publication 2003/0236174. Fu discloses a high density fracturing fluid and methods for using same.

Fluids according to Fu may comprise a surfactant like erucylamidopropyl betaine [a zwitterionic surfactant] and a salt (such as a chloride or bromide of calcium or zinc or mixtures of these) forming a brine having a density above about 1.5 g/cm³ (see page 1,

paragraphs 7-8); these fluids are useful in oilfield treatment methods like hydraulic fracturing (see page 1, paragraph 15). An oleyl acid amide betaine containing surfactant may also be used (see page 3, paragraphs 33-34). The fluid can be pumped as a liquid, energized or foamed with nitrogen or maybe carbon dioxide or air (see page 5, paragraph 48). Such a high density fluid would inherently allow for fracturing at comparatively reduced surface pressure.

The reference teaches all of the limitations of the rejected claims, except for the specific foam quality. One of ordinary skill in the art upon deciding to use an energized fluid according to the reference would have had to select a foam quality to operate from, and it would have been obvious to perform the routine experimentation needed to optimize this parameter. In the course of this work, such an artisan would have come up with qualities within the scope of the rejected claims, especially considering that the foam quality recited is not very specific (at least 25%). The claims are thus rendered obvious.

6. Claims 1-2, 5 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over England et al. in US Patent Application Publication 2004/0023812. England discloses a high density fracturing fluid and methods for using same.

In particular, England discloses a method of fracturing a formation at reduced surface pressure including injecting into a wellbore a fracturing fluid based on a liquid medium having a density higher than 1.3 g/cm³, and this method may also include adding proppant and energizing the fluid (see Abstract and page 2, paragraph 16). Note

that no specific/required order is given for these steps, so the disclosure is properly taken as disclosing these steps in any order; thus, the fluid may be energized before injection. Also, note that England states that "energized fluid" means at any foam quality with 52% mentioned which is at least 25% and at least 50% (see page 2, paragraph 16). England discloses more specific fracturing fluids such as those based on a liquid medium with density greater than $1.8[\text{g/cm}]^3$ and those comprising a zwitterionic surfactant (such as a betaine containing an oleyl acid amide or erucic acid amide group) and salts (such as calcium chloride, calcium bromide, potassium bromide, sodium bromide and mixtures of these) (see Summary of Invention on pages 1-2 and claims on pages 4-5).

The reference teaches all of the limitations of the rejected claims, except for the specific energizing gas. One of ordinary skill in the art upon deciding to use an energized fluid according to the reference would have had to select an energizing gas. It would have been obvious to this artisan to use one or more of nitrogen, carbon dioxide or air as these are notoriously well known for this purpose and readily available in large quantities. The claims are thus rendered obvious.

7. Claims 1-2, 5, and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lungwitz et al. in US Patent Application Publication 2002/0033260 especially in view of WO 98/56497 and Thompson et al. in US Patent 6,302,209. Lungwitz discloses fracturing fluids and methods of using same. The disclosures of WO

Art Unit: 1712

98/56497 were discussed in detail above. Thompson discloses various compositions and methods relating to wells.

Disclosed in Lungwitz is a fluid comprising (among other components) a high brine carrier of density preferably from about 1.2 g/cm³ to 1.8 g/cm³ and a zwitterionic surfactant which may be a alkylamidoalkyl betaine like oleamido propyl betaine (see page 1, paragraphs 10-11, page 2, paragraph 18 and page 4, paragraph 43). The brine may contain sodium or potassium bromide, calcium chloride or bromide, or even zinc halides (although zinc halides are not preferred) (see page 2, paragraph 17). When used as a fracturing fluid, a proppant may be included (see page 2, paragraph 23). Additives [presumably could include an energizing gas, see below] may be added at any time or even after injection into a well bore (see page 3, paragraph 25).

Lungwitz also discloses methods of fracturing a formation [using the fluids disclosed] with steps known in the art including pumping the fracturing fluid downhole (see page 4, paragraph 40).

Lungwitz calls out all the limitations of the rejected claims in proper context, except it does not specifically disclose the fluid as energized, nor any of the specific energizing gases, foam qualities or specifically call out use of a betaine containing an erucic acid amide group (although it does generically disclose this material in paragraphs 10-11) as in claim 7. Note that the high density fluid of Lungwitz would inherently allow for fracturing at comparatively reduced surface pressure.

WO 98/56497 discloses fracturing fluids very similar to those of Lungwitz which as discussed above may be energized or foamed with air, nitrogen or carbon dioxide,

Art Unit: 1712

may contain a erucylamidopropyl betaine surfactant (see page 6, lines 5-8; page 6, line 21 to page 7, line 23; and formula V, page 8 in WO 98/56497). As previously stated, Lungwitz teaches the use of [the fluids disclosed] in fracturing techniques known in the art.

One of ordinary skill in the art would have known of the general benefits of energizing fracturing fluids (such as superior clean-up and lower requirements for expensive chemical components) and would have been motivated to energize the fluids of Lungwitz accordingly, especially in view of the disclosure of WO 98/56497 just discussed. Further such motivation would have been found in Thompson at column 1, lines 57-61, where the general principle that expansion of an energizing/foaming gas after fracturing promotes better clean-up is disclosed. WO 98/56497 discloses the use of air, nitrogen or carbon dioxide for energizing as stated above.

As to the foam qualities recited, one of ordinary skill in the art upon deciding to use an energized fluid would have had to select a foam quality to operate from, and it would have been obvious to perform the routine experimentation needed to optimize this parameter. In the course of this work, such an artisan would have come up with the qualities of the rejected claims – especially considering that the foam qualities recited are not very specific (at least 25% or 50%).

As to claim 7, one of ordinary skill in the art would have noticed the specific recitation of the erucyl acid amide betaine in WO 98/56497 that was generically described in Lungwitz and would have been motivated accordingly to use it in making fracturing fluids.

Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1-2, 5, 7-10 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3, 6-7 and 9-11 of copending US Patent Application No. 10/249,943 by England et al.

Although the conflicting claims are not identical, they are not patentably distinct from each other.

Claim 1 would have been obvious to one of ordinary skill in the art over claim 11 combined with claims 2 and 6 of the reference using an obvious foam quality and energizing gas (see above on these last two items). The combination would have been made as one of ordinary skill in the art got more specific based on claim 11. This idea is used in the other combinations below.

Claim 2 would be obvious over claim 11 combined with claims 3 and 6 of the reference using an obvious foam quality and energizing gas (see above on these last two items). The combination would have been made as one got more specific based on claim 11.

Claim 5 would be obvious over claim 11 combined with claims 2 and 6 of the reference using an obvious energizing gas (see above on the last items). The combination would have been made as one got more specific based on claim 11.

As to claims 7-10, one of ordinary skill in the art would have made these in the course of optimizing what can be learned from the teachings of claim 11 in the reference in light of claims 2, 6-7 and 9-10 of the reference, as well as using an obvious foam quality and energizing gas (see above on these last two items). The combination would have been made as one got more specific based on claim 11.

Note that the cube superscript in the claims of the reference application are taken to be g/cm³ after considering the specification of this application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

10. Applicant's arguments filed September 12, 2005 have been fully considered but they are not persuasive. Before responding to the arguments regarding the rejection on the merits, the Examiner notes several relevant items.

First, the Examiner acknowledges receipt of a new declaration/oath in the case on September 12, 2005. It appears to be in order, so the objection in the previous Office Action concerning it is withdrawn.

Second, the Examiner acknowledges the substitute specification submitted with Applicant's arguments. It does not appear to introduce new matter and is hereby entered. The previous objection to the specification is hereby withdrawn also.

Third, the Examiner notes that Applicant has requested amendments to claims 1 and 7-10, as well as the cancellation of claims 3-4 and 6. These requests are hereby entered. In future, it would be helpful if Applicant indicated in a conspicuous place in the Remarks where support for claim amendments can be found. The Examiner could not find support for Applicant's amendment to claim 1 in full in either the specification or claims as originally filed, nor was there any indication of where to look in Applicant's Remarks; specifically, the density of greater than 1.35 g/cm³ is not supported, and a new rejection has been made above accordingly. Note that these amendments render

Art Unit: 1712

the previously made claims objections to claims 3 and 9-10 moot, so the objections are hereby withdrawn.

Moving on to the rejections on the merits made in the previous Office Action in regards to the claims as amended.

As to the rejection under 35 USC 102(b) over WO98/56497, this rejection is withdrawn because of Applicant's incorporation of the limitations of claim 4 into claim 1; however, a corresponding rejection under 35 USC 103(a) has been made above using this reference alone. For a discussion as to the density limitation, see below.

As to the rejection under 35 USC 102(e) over Fu et al., this rejection is withdrawn because of Applicant's incorporation of the limitations of claim 4 into claim 1; however, a corresponding rejection under 35 USC 103(a) has been made above using this reference alone.

As to the rejection under 35 USC 102(e) over England et al., this rejection is withdrawn because of Applicant's incorporation of the limitations of claim 3 into claim 1; however, a corresponding rejection under 35 USC 103(a) has been made above using this reference alone.

As to the rejection under 35 USC 103(a) over Lungwitz in view of other references named therein, this rejection is maintained as follows. First, it should be stated that Applicant's argument as to the unpredictable chemistry and physics of the compositions in question, if valid, brings up many thorny issues for Applicant's case. That is, Applicant's claims are fairly generic, and the disclosure supporting them is rather thin on specific teachings, so if the Examiner were to accept Applicant's

argument of unpredictability, then Applicant would be subject to fatal rejections under 35 USC 112 paragraph one for failure to describe/enable the invention – there would be potentially many unidentified inoperative species embraced by the claims for one thing. The Examiner does not believe this argument by Applicant is of significance here (see below), so such rejections will not be made.

Regardless of whether Applicant's characterization is correct or not in some general sense, it is not of real importance in the specific instance at hand. The compositions of Lungwitz and WO 98/56497 are very similar despite Applicant's contention (without explanation) otherwise, and the energizing of fracturing fluids is well known; there would have been every reason for one of ordinary skill in the art to expect a successful combination here. Further, the point on obviousness of most relevance to the discussion here is that "only a reasonable expectation of success" is required (see MPEP 2143.02). Under the circumstances just outlined here and in more detail in the rejection, the Examiner believes that this standard is met. Mere assertions by Applicant do not prove otherwise; Applicant has presented no hard evidence to counter the Examiner.

Applicant's makes other arguments based on features of the invention not claimed. These are simply not relevant and do not need to be addressed further. What is not claimed is of no concern.

As to the issue of "up to 30%" and "less than 50%", Applicant has misconstrued the Examiner's point. As cited in the rejections above, the WO reference states that the inorganic salts will typically be present in only a minor amount and gives as an example

Art Unit: 1712

something like less than 20 weight percent at that point. However, the same reference later states that up to 30 weight percent inorganic salt is typical. The issue is the meaning of "minor"; it can mean a very small amount or an amount less than half. The point here is if something is present typically in a minor amount and typically at up to 30 weight percent, then minor doesn't mean very small but something less than half.

In any case, interpolating between the data points given in the rejections above for zinc bromide, a zinc bromide solution of just a little over 32 weight percent would have a density of just over 1.35 g/cm³; a little over 32 percent solution would be at least obvious over a teaching of typically up to 30 weight percent (and also at least obvious over a teaching of less than half).

As to the rejection under 35 USC 103(a) over Norman in view of Teot, this rejection is overcome by Applicant's amendments and is hereby withdrawn. Note that Applicant's arguments as to unreasonableness of the combination were not a factor in withdrawing the rejection (see discussion of the rejection over Lungwitz above).

The Examiner acknowledges Applicant's response to the double patenting rejection over England and finds it acceptable for now. The rejection is maintained in the meantime.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See

Art Unit: 1712

MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to C. R. Richard whose telephone number is 571-272-8502. The examiner can normally be reached on M-Th, 8am-6pm and alternate Fridays, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1712

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Michael


PHILIP TUCKER
PRIMARY EXAMINER
ART UNIT 1712